15. The image recording apparatus of claim 14, wherein said thickness profile includes data for an entire area of the recording material disposed on said recording drum.

16. The image recording apparatus of claim 14, wherein the thickness detecting means is located on an opposite side of said recording drum from said laser beam.--

REMARKS

This Amendment, submitted in response to the Office Action dated April 4, 2000, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As preliminary matters, the Examiner has objected to claim 12 for containing informalities. Claim 10 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Corrections for addressing these matters have been attended to. As an additional preliminary matter, the Official Draftsperson has objected to the drawings submitted on June 22, 1999. In this connection, Applicant directs the Examiner's attention to the formal drawings filed on August 26, 1999.

Turning to the prior art rejections, claims 1-12 remain pending in the application. Claims 1-6 have been rejected under 35 U.S.C. § 103 as being unpatentable over Fujimura et al. (U.S.P. 5,397,763, hereafter "Fujimura") in view of Guy et al. (U.S.P. 5,258,776, hereafter "Guy"). Claims 7-9 and 11 have been rejected under § 103 as being unpatentable over Fujimura in view of Guy and further in view of Ferschl et al. (U.S.P. 5,196,866, hereafter "Ferschl"). Claims 10 and 12/1-12/11 have been rejected under § 103 as being unpatentable over Fujimura in view of

Guy and further in view of Hagyuda et al. (U.S.P. 4,269,491, hereafter "Hagyuda"). Applicant amends the claims to describe the invention more particularly. Applicant further respectfully submits the following arguments in traversal of the prior art rejections.

Applicant's invention relates to an image recording method using a toner sheet and image receiving paper, where inks are successively transferred from toner sheets including K, C, M and Y inks to an image receiving sheet when irradiated by a laser source. In such image recording processes, the image receiving sheet must be transferred to a separate apparatus to reproduce the image on a recording sheet. This additional transfer step complicates the image processing method, and during the transfer, the image receiving sheet may become contaminated with dust or experience other damage. Additionally, the thickness of the imaging sheet may vary depending on its location on a recording drum. Since the irradiated laser light maintains a fixed focal length, this variation in thickness can cause degradation to the image recorded on the image receiving sheet.

The present invention obviates these deficiencies by applying toner inks directly to the recording sheets. Referring to Fig. 2, the method includes placing a recording sheet 7 on a recording drum 2. Then, an image receiving sheet 5, having image receiving layer 5a and substrate 5b, is placed over the recording sheet 7. A toner layer 6, having a substrate layer 6a and toner layer 6c, is disposed on the image receiving layer 5. After the substrate 5b of the image receiving sheet is separated, the toner layer 6c is in direct contact with the image receiving layer 5a. Laser light is irradiated to the toner layer to transfer an image according to recording data. The process of image transfer can be repeated for different color toners. As an additional

feature of the invention, the image receiving sheet includes a cushion layer (Fig. 11, element 5c) disposed underneath the image receiving layer 5a and in contact with the recording layer. The inclusion of the cushion layer helps maintain an even writing surface and aids in the application of toner inks, thereby preventing toner separation. A further protective layer (See Fig. 13, element 8a) can be added to the recorded image after all toner transfers are completed.

In another embodiment of the invention the focal length of the laser is adjusted according to a detected thickness of the recording paper attached to the head drum. The thickness detection and focal length adjustment can be performed concurrently with the laser irradiation. Alternatively, the thickness information can be prestored and read out during laser scanning.

Turning to the cited art, Fujimura relates to a heat transfer sheet that is suitable for transferring pre-printed images to a substrate using a heat and pressure transfer method. Col. 12, lines 62-65. Referring to Fig. 5, the heat transfer sheet 10 includes a base 1. Ink portions Y, M, C, B_k are included in the same layer as an adhesive image forming layer 6. Col. 3, lines 35-45. As shown in Fig. 6B, when the pre-printed ink image is applied to a substrate, an ink 11 is supplied into the image forming layer. Col. 4, lines 5-10. Fujimura seeks to meld the ink layer and the image forming layer together in order to provide better adhesion of the image to any surface. Col. 2, lines 30-40.

Guy relates to an apparatus for accurate control of pixels formed by heat sources in relationship to a receiving material placed on a rotating drum.

Ferschl relates generally to a beam focusing mechanism for a laser writing device. In relevant part, the focusing beam is provided through a optical fiber 62 which is mounted on the

same substrate 34 as the array of writing fibers 60. (Fig. 3) Close proximity permits monitoring of the writing surface to which the writing beams are concentrated. Col. 9, lines 44-46. In this manner, thermal effects can be taken into account during the writing process. Col. 3, lines 12-15.

Hagyuda relates to distance judging circuit for a writing apparatus.

The Examiner maintains that the combination of Fujimura and Guy teach each feature of claim 1. The Examiner concedes that Fujimura does not include a step of providing a recording layer on a support, but cites Guy to make up for this deficiency. Applicant argues that the rejection is not supported for at least three reasons.

First, as an initial matter, Fujimura is drawn from non-analogous art and thus may not be applied against Applicant's claims. Proper prior art references must satisfy one of two criteria. The reference must be in Applicant's field of endeavor, or alternatively, the reference must be reasonably pertinent to the problem with which Applicant was concerned. Fujimura does not satisfy the first prong since Fujimura relates to transfers of images that have already been recorded onto a heat transfer sheet. By contrast, Applicant's invention is concerned with the initial recording of images using selected toner amounts. The problems attendant with making an image and transferring the image to a desired substrate entail different concerns. As a result, Fujimura does not satisfy the second prong. Applicant's invention addresses problems of reducing contaminants on an image receiving layer, reducing the number of steps in an image production process, and maintaining a proper laser beam focus while recording an image using toners. By contrast, Fujimura attempts to formulate appropriate chemical combinations so that a

Fujimura is clearly analogous art pertaining to formation of images — see col. 2, lines 30-38

resin adhesive layer can maintain adequate contact with a substrate and absorb inks. Therefore, the rejection over the primary combination of Fujimura and Guy should be withdrawn for at least this reason.

Second, even assuming *arguendo* that Fujimura may properly be applied against Applicant's claims, the Examiner has not supplied an adequate rationale for combining the features of each reference. This suggests the use of hindsight in making the rejection. As a related matter, Applicant argues that Fujimura may not be modified to include the rotating drum of Guy in the manner suggested by the Examiner. This is due to the differences between the manner of heat application in each reference. Guy is concerned with maintaining adequate laser control to maintain accurate images on a pixel by pixel basis. By contrast, Fujimura uses a method requiring simultaneous application of heat and pressure in order to produce the heat transfer. In Fujimura, the pressure is applied to a back surface of the recording paper (Fig. 13, element 130) while the heat is applied to the heat transfer sheet (Fig. 13, element 8). Col. 12, lines 60-65. It is clear that Fujimura requires physical contact between the heat source and heat transfer sheet to be effective. If Fujimura were modified to include placing a recording sheet on a recording drum as taught by Guy, then this would not make it possible to supply the pressure necessary to perform the heat transfer. Furthermore, one skilled in the art would not apply pressure to the rotating drum of Guy since this would potentially alter the distance between the drum and laser, thereby disrupting the focusing mechanism of the laser. As a final matter, generally no physical contact is provided in the laser-based recording devices such as Guy. Therefore, with the lack of physical contact and resulting lack of pressure, the heat transfer of

Fujimura would not be possible. Therefore, the rejection should be withdrawn for this additional reason.

Third, assuming *arguendo* that Fujimura and Guy may be properly combined, their combination does not teach each aspect of independent claim 1. For example, claim 1 describes a step of transferring a toner onto an image forming layer. By contrast, in Fujimura, the image receiving layer 3 is formed concurrent with the dye layers 2 as shown in Fig. 2B so that the two components are melded together as shown in Fig. 6B. Therefore, Applicant submits that the concurrent formation of the two layers does not teach having a toner formed onto an image forming layer as described by claim 1. Additionally, as amended, claim 1 describes forming an image receiving layer uniformly on a surface of the recording paper. By contrast, Fujimura teaches sectional formation of an image. Thus, Fujimura has more severe positional restrictions than the present invention. Guy does not correct these deficiencies of Fujimura. Therefore, claim 1 is patentable for this additional reason.

Because claims 2-11 and 12/1 are dependent upon claim 1, these claims are patentable for at least the reasons set forth above for the independent claim.

With further regard to amended claims 2 and 4, these claims describe a cushion layer in physical contact with the recording layer. By contrast, in Fujimura, the cushion layer is described as being between an image forming layer and adhesive layer. As shown in Fig. 6a, the adhesive layer 5 will always prevent physical contact between any cushion layer and a recording medium 7. Therefore, claim 2 and 4 are patentable for this additional reason.

The Examiner further maintains that claims 7-9 and 11 are unpatentable over the combination of Fujimura, Guy and Ferschl. The Examiner cites Ferschl for teaching the thickness determination device that is lacking in the primary combination. However, Ferschl fails to cure the fundamental deficiencies discussed above, and therefore the rejection of claims 7-9 and 11 should be withdrawn for at least this reason.

With further regard to amended claim 11, this claim describes that the thickness measuring device and the writing beam are disposed on opposite sides of the drum. By contrast, in Ferschl, the beams are spaced on the same substrate and thus are necessarily on the same side of the rotating drum. In fact, the sources for the focus and write beams are spaced apart by only 20 diameters of an optical fiber. Col. 9, lines 1-2. This close proximity discussed in the Ferschl is believed to provide a more accurate reading for the receiving medium characteristics, and thus there is no motivation to modify the placement of the focusing and writing devices of the reference. Therefore, claim 11 is patentable for at least this additional reason.

With regard to claim 10, the Examiner further cites Hagyuda for teaching the memory for storing the thickness information for an area to be scanned by the laser beam. However, one would not be motivated to include such a feature in Ferschl since Ferschl also attempts to take into account thermal variations during a writing process, e.g. on a real time basis. This would teach away from storing profile information in advance and subsequent focusing of the lens. Therefore, claim 10 is patentable for this additional reason.

With regard to claim 12, the Examiner maintains that the combination of Fujimura, Guy and Ferschl teach each aspect of the apparatus described to perform the methods of any of claims

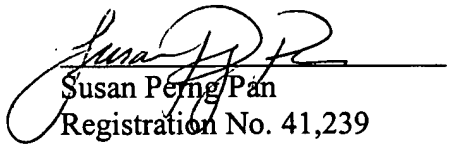
1-11. However, the deficiencies of the combination are set forth above. Therefore, claim 12 is patentable for at least these reasons.

Applicant adds claims 13-16 to describe the apparatus more particularly

In view of the above, Applicant submits that claims 1-12 and new claims 13-16 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,



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